Volunteer Lake Assessment Program Individual Lake Reports
RAND POND, GOSHEN, NH

MORPHOMETRIC DATA

							TROPHIC CLASSIFICATION		KNOWN EXOTIC SPECIES

Watershed Area (Ac.):	326	Max. Depth (m):	8.2	Flushing Rate (yr^{-1})	1.4	Year	Trophic class
Surface Area (Ac.):	39	Mean Depth (m):	3.4	P Retention Coef:	0.66	1979	OLIGOTROPHIC
Shore Length (m):	1,800	Volume (m³):	534,000	Elevation (ft):	1257	1994	OLIGOTROPHIC

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

RAND POND - PUBLIC WAY BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.
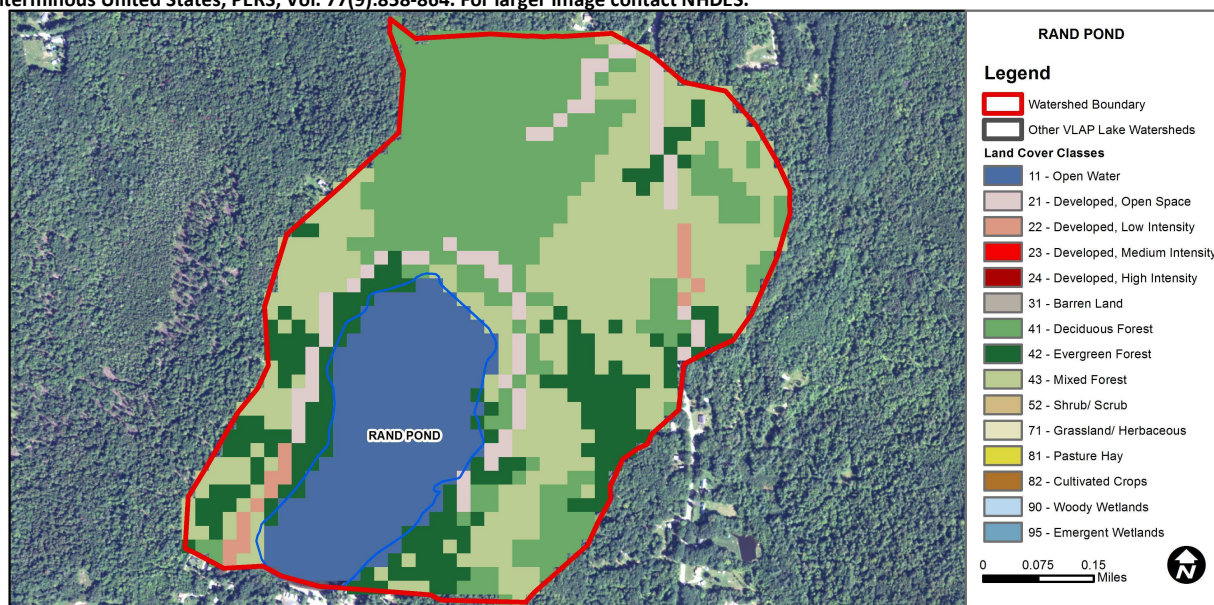
Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	17.8	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	5.5	Deciduous Forest	28.43	Pasture Hay	0
Developed-Low Intensity	1.42	Evergreen Forest	15.09	Cultivated Crops	0
Developed-Medium Intensity	0	Mixed Forest	32.02	Woody Wetlands	0
Developed-High Intensity	0	Shrub-Scrub	0	Emergent Wetlands	0

Observations and Recommendations (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

- **Chlorophyll-a:** Chlorophyll levels were low in June and then increased to slightly elevated levels in August and September. The 2014 average chlorophyll level increased from 2013 and was approximately equal to the state median. Historical trend analysis indicates relatively stable chlorophyll with moderate variability between years, and chlorophyll levels have generally remained greater since 2011.
- **Conductivity/Chloride:** Deep spot and Outlet conductivity levels were only slightly greater than the state median. Historical trend analysis indicates significantly decreasing (improving) epilimnetic (upper layer) conductivity since monitoring began. We hope to see this continue! Inlet conductivity levels were slightly elevated in June and August and then decreased to average levels in September.
- **Total Phosphorus:** Epilimnetic phosphorus levels remained low from June through September, decreased slightly from 2013, and were less than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years; however average phosphorus levels appear to have increased slightly from lower levels measured between 1999-2001. Hypolimnetic (lower water layer) phosphorus was slightly elevated in June and turbidity was also slightly elevated. Inlet and Outlet phosphorus levels were low and relatively stable between June and September, however tributary phosphorus levels have become increasingly variable since 2008.
- **Transparency:** Transparency was good in June and much better than the state median when algal growth was low. Transparency decreased in August and September due to the increased algal growth. Average transparency was stable with that measured in 2013 and slightly better than the state median. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- **Turbidity:** Epilimnetic turbidity increased from June to September with increasing algal growth. Hypolimnetic turbidity decreased from June to September and was average for that station. Inlet turbidity was slightly elevated in June and September following rain events. Inlet turbidity has significantly increased since monitoring began, in particular, turbidity has increased and become more variable since 2009. Outlet turbidity was elevated in August and Outlet turbidity has also significantly increased since monitoring began, in particular, turbidity has increased and become more variable since 2006.
- **pH:** Epilimnetic pH levels were within the desirable range 6.5-8.0 units, however Hypolimnetic pH levels fluctuated below the desirable range. Historical trend analysis indicates relatively stable epilimnetic pH with moderate variability between years.
- **Recommended Actions:** The increased frequency and intensity of significantly storm events has likely led to significant increases in tributary turbidities and the higher variability in chlorophyll, transparency and epilimnetic phosphorus levels. This highlights the importance of managing stormwater runoff in the watershed. Dirt/gravel roads, sandy beaches, steep slopes, and unstable shorelines can all be subject to stormwater erosion transporting sediments and nutrients to streams and the pond. DES' "NH Homeowner's Guide to Stormwater Runoff" is a great resource for lake residents to implement stormwater best practices to reduce runoff from their properties. Contact the VLAP Coordinator if you would like copies. Keep up the great work!

Station Name	Table 1. 2014 Average Water Quality Data for RAND POND							
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
					NVS	VS		
Epilimnion	8.7	4.61	67.7	8	3.63	3.68	1.33	6.88
Hypolimnion			67.2	11			2.16	6.55
Inlet			92.6	7			1.16	6.71
Outlet			67.3	10			1.54	6.84

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Improving	Data significantly decreasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data